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14. ABSTRACT  This grant provided funds to partially support American graduate and postdoctoral students to attend the Graduate Summer Institute on Complex Plasmas, which was held from July 30 to August 7, 2008 at Stevens Institute of Technology in Hoboken, New Jersey. High priority was given to support students who were members of traditionally underrepresented groups in the STEM (Science, Technology, Engineering, and Mathematics) disciplines.					
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# **Final Performance Report on the "Summer Institute on Complex Plasmas" in Hoboken, NJ**

## **July 30 - August 8 2008**

### **1. Scientific program**

The program of the summer institute consisted of tutorial lectures, contributed lectures, and posters.

#### **A. Tutorial Lectures:**

There were 8 lectures from scientists from the New Jersey-New York area (Stevens Institute of Technology, Saint Peter's College, and Polytechnic Institute of New York University). The German participants contributed 11 tutorial lectures - 5 from Kiel and 6 from Greifswald scientists. In addition, high-ranked speakers from other leading U.S. plasma physics centers were invited and delivered 8 tutorial lectures (University of Illinois at Urbana-Champaign, Princeton Plasma Physics Laboratory, University of California- Los Angeles (UCLA), and the Naval Research Laboratory. Finally, one tutorial speaker came from Russia. Duration of the tutorials was from 60 to 90 minutes.

#### **B. Contributed Research Lectures:**

Aside from tutorial lectures there were 30 minutes talks presented by postdocs and PhD students from Kiel (9) and Greifswald (6) which focused on modern developments in complex plasma research in the SFB-TR 24 program of the Germany.

#### **C. Research Posters:**

The scientific program was complimented by 19 posters devoted to recent results in complex plasmas, presented by German research groups from Kiel and Greifswald.

### **2. Participants of the Summer institute**

There were a total of 60 participants, mostly graduate students (PhD-students) and postdocs.

#### **A. American participants**

This includes 30 full-participants from 16 American Universities and Colleges, in particular from Baylor College (1 participant), Boston College (1), California State Poly U-Pomona (1), City College of New York (1), Georgia Institute of Technology (4), Iowa State University (1), Michigan Technical University (4), Penn State (1), Princeton University (1), Stevens Institute of Technology (2), Tufts (1), University of California Los Angeles (3), University of Illinois at Urbana-Champaign (3), University of Iowa (2), Drexel University (2) and the University of Michigan (2). In addition, a group of 10 students from the Princeton Plasma Physics Lab attended one day of the school.

This grant funded the full travel and/or accommodation expenses of 14 American students Stephanie Stattel (University of California Los Angeles), Carrie Niemela (Michigan Technological University), Michael Lang (Stevens Institute of Technology), Sean Donovan (Stevens Institute of Technology), James Creel (Baylor College), Jun Xue (Tufts University), Mingmei Wang (Iowa State University), Stella Hartono (California State Poly U-Pomona), Yan Feng (University of Iowa), Timothy M. Flanagan (University of Iowa), Dmitry Opaitis (Princeton University), Moogega Cooper (Drexel University), Bakhtier Farouk (Drexel University), and Russell Vela (Penn State University). Further, funds were used to transport on a bus these and a few other students (20) to a summer institute session held at the Princeton Plasma Physics Laboratory.

## **B. Participants from other countries**

The group of participants was truly international, participants came from 9 countries. The group included four from China, two from Korea, 18 from Germany (from three Universities), one from Romania, 1 from Russia, 1 from Sweden, 1 from the Ukraine, 1 from Yugoslavia.

## **3. Schedule and venue of the Summer Institute**

### **A. Main goals of the Summer Institute**

The main goal of the Summer Institute was to train graduate students in the topics of Complex plasmas which include dusty plasmas, strongly correlated plasmas, reactive plasmas along with interaction of plasmas with surfaces, microplasmas, and quantum plasmas. These are topics of high current interest in plasma physics which go beyond the traditional courses. Therefore, the summer institute intended to give an introduction into these fields and an overview on recent research developments. Furthermore, the summer institute aimed at fostering direct discussions between students and scientists and future scientific contacts and collaborations.

### **B. Schedule the Summer Institute**

For the reasons mentioned above, the program included ample time for discussion both, after the talks and in the coffee breaks, for details of the program see the web page of the institute. Furthermore, after the afternoon session each day, there was a special time slot for discussion with speakers and poster presenters (the posters were on display throughout the whole workshop). In fact, there was a very lively and informal discussion.

The scientific program which took place in the Physics Department at Stevens Institute was completed by a special session devoted to plasma research related to magnetic confinement fusion and inertial confinement fusion which took place at the Princeton Plasma Physics Lab.

### **C. Venue of the Summer Institute**

Stevens Institute of Technology provided an excellent location for the Summer Institute. Stevens provided a state of the art lecture rooms and wireless internet connections was also available. Further, housing for students which was located close to the lecture rooms was made available by Stevens Institute at a reasonable cost.

## **4. Organization of the Summer Institute**

The summer institute was organized jointly by scientists in the U.S. and Germany: the local organization was taken care of by scientists from Stevens Institute of Technology, Saint Peter's College, and New York Polytechnic University of NYU. The German co-organizers are from Kiel and Greifswald Universities and are members of the Transregional Research Center "Fundamentals of Complex Plasmas" TR24 of the Deutsche Forschungsgemeinschaft. This joint organization turned out to be very fruitful since experience and scientific background of the organizers complemented each other in an ideal way.

## **5. Publication of Workshop material**

### **A. Internet publication**

To allow for an in-depth study of the lectures by the students, the talks have been made available online at the web-site of the Summer Institute. This provides a valuable reference on the modern status of complex plasma research for the workshop participants but also for the general plasma physics community.

## **B. Book publication**

In addition to the online publication, selected tutorial lectures will be published as a book with Springer Verlag which is scheduled to appear in late 2009.

## **6. Financial Support**

Financial support for the Summer Institute was generously provided by American and German organizations:

- German Science Foundation (Deutsche Forschungsgemeinschaft) via Transregional Research Center TR24,
- Air Force Office of Scientific Research (AFOSR),
- Army Research Office (ARO),
- National Science Foundation (NSF),
- Polytechnic University of NYU,
- Princeton Plasma Physics Lab

This support made possible that such a large number of students could participate at a very low cost and also that a high ranked scientific program could be put together.

## **7. Final Outcome**

Through funds from the AFOSR's Electro-Energetic Physics Program directed by Program Manager Dr. Robert J. Baker, a total of 14 American students were directly funded for travel and/or accommodation expenses. These funds further allowed for the bus transportation of approximately 20 addition students to a workshop session at the Princeton Plasma Physics Laboratory venue. A total of 5 female students were supported by these AFOSR funds and two members (an African-American and Hispanic) of traditionally underrepresented groups were further funded through this grant.

A total of \$9093.42 of the requested \$9,750.00 was used for this project. The remaining unused funds of \$656.59 will be sent to AFOSR/PKC.

Due to the great success of this Summer Institute it is likely that in next year 2010 or 2011 a similar educational workshop will be organized once again. For the final program booklet and access to the various tutorial presentations of the 'Summer Institute on Complex Plasmas', see the web page <http://www.theo-physik.uni-kiel.de/~bonitz/si08.html>